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AUTHOR	Harrison, Bruce, Jr.
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ABSTRACT

While the major part of any class is the classroom contact time, out-of-class support often makes the difference between success and failure of a student. With distance learning classes, teachers are faced with a unique set of problems in supplying this outside support. Students are often spread over large geographical areas and have varying schedules due to work and family considerations. This paper covers the following hardware and software tools that can help to overcome these problems: (1) e-mail, including its use for communication between instructors and students, distribution of syllabi, and turning in of assignments; (2) electronic mailing lists, especially those managed by list-processing software, as a means of asynchronous class discussion; (3) computer conferencing, including requirements and software options; (4) World Wide Web services, including posting/downloading files, graphics, and other multimedia materials; (5) audio and video materials via the Internet, including recording and storing audio/video, the ability to broadcast audio, and video teleconferencing; (6) other Internet services, including InterRelay Chat, MOOs, and MUDs, and online content-delivery servers; and (7) telephone-based technology, including voice mail, telephone conferencing, and fax services. Problems to consider, including availability of hardware/software, access control, Internet access, copyright issues, training, and costs, are noted. (Author/DLS)

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Hardware/Software to Support Distance Learning Classes

Bruce Harrison, Jr.

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Abstract

While the major part of any class is the classroom contact time, out-of-class support often makes the difference between success and failure of a student. With Distance Learning classes, we are faced with a unique set of problems in supplying this outside support. Our students are often spread over large geographical areas and have varying schedules due to work and family considerations. In order to overcome these problems, there is a wide array of hardware and software tools at our disposal. We will explore such tools as electronic mail, World Wide Web servers, computer conferencing software, voice/telephone technology, and Internet services such chat, audio, and video.

Introduction

Outside support of a traditional class includes office hours for the instructor, review sessions, notes posted on a bulletin board, extra handouts available from the office secretary, peer-led study sessions, and classroom note-sharing among students. When everyone was normally in the same geographical location and had some time during the week to meet with others, it was fairly easy to interact and/or get help with classroom work. With the advent of technology based distance learning, our classes are now spread over a wide geographical area and contain non-traditional students with diverse schedules. Now our task of supplying and encouraging this outside support becomes much more difficult. How do you hold a review session for 25 people separated by 100 or more miles, and who may be working unusual schedules? What about the people away on a business trip? How do students share notes and ideas outside of class? How can these students ask questions of the instructor and get a timely answer? What about help with working a math problem or checking a circuit diagram? Hopefully, the technology that caused some of these problems can also help solve these same problems. I would like for us to take a look at some of this technology and apply it to the above concerns.

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Electronic Mail

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Our first tool is a familiar one, electronic mail (E-mail). You may already have E-mail access, but if not, get an E-mail address, learn how to read your E-mail, and acquire the habit of reading it at least once a day (hopefully more). Having done this, be sure your E-mail address is listed in the class syllabus and is well-known to the students. At the beginning of class request the E-mail addresses of all students. These can be incorporated into a nickname or list in your E-mail software, making it quite easy to send E-mail to the entire class. Some instructors distribute the syllabus via E-mail, and even require homework to be submitted using E-mail. Encourage your students to become familiar with and use E-mail; perhaps even require its use.

E-mail is the probably one of our "lower-tech" solutions. As long as someone has access, they can be using an older computer, or even a terminal attached to a company mainframe. The drawback is that E-mail is a text-only medium. It is possible to attach a word processor document (or other files such as a spreadsheet) to an E-mail message. The student then reads the E-mail, saves the attachment, and opens the attachment using applicable software.

Electronic Mailing Lists

If the class is fairly large, maintaining an up-to-date list of all E-mail addresses can be a problem. In addition, each person in the class must maintain that same list. A better solution is to use some version of list processing software (listserv, listproc, majordomo, etc.) and to set up a mailing list for the class. In this scenario, an electronic list is created and everyone in the class subscribes to this list. When E-mail is sent to the list, it is automatically forwarded to all subscribers on that list. With this tool, only one copy of all E-mail addresses is required. Normally you, as the owner of the list, control who is on the list. People are added or deleted from the list as required. With list processing software, it is possible to maintain an archive of all E-mail sent via the list. This is useful for students wishing to catch up after an absence. Most list processors also allow the storing of files and their subsequent retrieval by list members.

If E-mail is to be an integral part of your class, I recommend using a list. This effectively deals with the problem of various schedules. Class members may read their E-mail from the list whenever they choose and reply at their leisure. Group discussion takes place without the entire group being present at any one time. In addition, a list best addresses the problem of maintaining a single, manageable list of all E-mail addresses.

Computer Conferencing

Computer conferencing is a software tool that allows multiple people to participate in a group discussion, exchanging text, images and sound in real time. This software requires all participants to have computers capable of running the conferencing software and be connected to the internet. The Internet connection can be via a LAN or dialup , but must be a network connection. Simple asynchronous dialup to a mainframe or other central computer is not enough. Using this software, it is possible to schedule an online classroom discussion without regard to location of the participants. Any computer on the internet and running the conferencing software may participate.

There is a particularly nice software package available via the Internet and it is free. The software "PowWow" is available from http://www.tribal.com and is suitable for both small and large conferences. It supports text, images, and sound. The only drawback is lack of Macintosh support. There are many commercial products available and should be surveyed for suitability and cost if you plan to do extensive computer conferencing.

If the majority of your students only have asynchronous access, there are several mainframe or central computer based conferencing packages on the market. You may want to

inquire with your computer services group on campus as to availability. These packages are normally text-only, but on the other hand they can be used in an older computers or terminal environment. In summary, the PC-based conferencing packages offer much more functionality, but require a higher level of hardware and network connection. Central computer based conferencing packages require a lower level of hardware and network complexity, but are text-only.

World Wide Web Services

Perhaps one of the best known tools at our disposal is the World Wide Web (or WWW) server. This tool is especially suited for posting such information as course syllabus, class notes, extra study material, links to other material on the internet, etc. In addition, files such as word processing documents and spreadsheets may be stored on the server and downloaded by students at their leisure. The WWW server excels as a way to make graphic images such as drawings or photographs available. Even audio files and video clips may be incorporated. To make full use of information on a WWW server, the student must have access directly to the Internet and be using a computer capable of running the newer WWW browsers such as Netscape or Internet Explorer.. A large investment in learning and preparation is required of the creator of these pages. There are tools available to aid in the creation of these pages, but it is still no trivial matter. With that said, the WWW server remains one of our best tools for making information available to a widespread audience. In addition, it is possible to use message boards and allow group discussion very similar to what takes place on an E-mail list.

Audio and Video Via The Internet

With today s technology, it is possible to record and store audio and video as computer files. These files can then be accessed from a WWW server or downloaded and played back later. This technology may have use with a music class to make listening examples available or for other classes to provide demonstrations. Video and audio files can be quite large and thus have long download times. Class members must also have sufficient computer resources to retrieve and play these files.

Audio files can be recorded with any computer equipped with a sound card. Video recording requires a special piece of hardware known as a video capture card. Input to this capture card can be a camcorder, VCR, or other video source. When dealing with video and audio recordings, copyright issues must be addressed. If the material is of your own creation, you may use it as you wish. If the material belongs to someone else, the question of copyrights comes into play. Often your library can provide information on this subject.

Another area involving audio and the Internet is the ability to broadcast audio. This can be pre-recorded or live audio. In this situation the audio is not stored on a computer but is put out on the Internet in real time. The broadcast is done by a special server and is received by special software. Two of the systems to do this live audio broadcast are RealAudio and Mbone. Check out http://www.realaudio.com and http://www.mbone.com for more information on either of these products. Using this technology it would be possible to make a live speaker available to a dispersed group with little effort. Students could hear a speech or presentation without being on campus.

Video teleconferencing via the Internet is another area that may have potential. Using a personal computer equipped with a video capture card, sound card, and software, it is possible to hold a live video/audio conference over the internet. While this is an exciting tool, it requires a large amount of bandwidth and fast network response time to be useful. If the Internet itself is slow during a conference, the user sees this as a frozen picture or gaps in the audio. "CuSeeMe" is probably the best known of the Internet video teleconferencing systems. Further information

can be obtained on this software from http://goliath.wpine.com/cu-seeme.html or http://gated.cornell.edu/pub/video/. For other software, use one of the search engines on the Internet and look for "video teleconferencing".

Other Internet Services - Chat, MOO, MUD, and WWW Broadcast

Another tool, similar to computer conferencing and WWW message boards, is IRC, or InterRelay Chat. This is a live, interactive, text-only discussion system. A chat server allows you to create various channels and to hold a discussion. The channel may be local to that server or connected via other servers to form a world-wide discussion. If students only have access to asynchronous dial-in and accounts on a central computer, chat can still be used via a chat client on that central computer. Others may participate via direct internet connections and clients on their individual computers. Check with your computer services group on your campus, a chat server may already be in place.

MOO s and MUD s, software that had its origins in the role-playing game arena, have been used in an educational setting to provide a gathering place for people to discuss and interact. The software creates various virtual rooms"; the participants can enter or leave a room, and once in a room interact with others there. Private conversations are also possible. A MOO or MUD server is required to create this environment. For an example of MOO s and MUD s used in an educational setting, check out http://www.missouri.edu/~moo/ which is the University of Missouri s Educational MOO. Also of interest may be the paper shown at http://sensemedia.net/sprawl/16880 which is entitled MUD s in Education: New Environments, New Pedagogies.

A new and emerging technology that may be of interest to the distance learning community is on-line content-delivery servers. These servers broadcast information over specified channels on the internet. The user receives this information via a special server software package or one of the newer Internet browsers. Currently the best example of this technology is PoingCast, but there are others in the market. Check out http://www.pointcast.com http://www.backweb.com http://www.intermind.com or http://www.netdelivery.com.

Telephone Based Technology

The telephone has become a standard fixture in our society and a number of information tools have sprung up around it. Answering machine and voice mail can be obtained quite easily and can be used to make information available 24 hours a day, and requires nothing other than a standard touch-tone telephone to use. Customized voice mail systems could be used to disseminate information on a number of classes. Telephone access to data on a mainframe or networked computer system is also available. Students can register for classes, check information, pay fees, etc. without having to travel to campus. While this is not strictly a teaching issue, it makes the entire educational process much easier and user-friendly.

Conferencing via telephone may be a useful classroom tool. Most campus telephone switches can establish a multi-way telephone conference. However, these may be limited in number. The local telephone company can also provide a dial-in conferencing service to accommodate many more callers. It would be possible to hold a review or discussion session among all class members over the telephone.

Fax services can be of use to the distance learning environment. Besides the normal fax machine, there are fax servers where a user may call in and request a specific document be faxed

to them. It would be possible to distribute class information and handouts via this method.

Problems to Consider

With all of our modern technology and global connections come a few problems. Several points need to be considered.

Availability of appropriate hardware and software for all students and instructors
Access control to keep outsiders from disrupting class discussions
Availability of internet access for all students
Copyright issues for audio, video, and printed material
Training students and instructors in the use of various software packages
Cost of acquisition and use of appropriate technology

Conclusion

A large and ever-growing collection of technology is now available, allowing us to better serve our students who may be geographically spread about our service area. With this new technology we can make it much easier for students to retrieve information, participate in out-of-class discussion and to maintain close contact with the instructor. This can often be done from the convenience of their home or office with no more than a modern pc and an internet connection.

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